THE AMERICAN JOURNAL OF

OPHTHALMOLOGY.

VOL. XIV. DECEMBER, 1897. NO. 12.

ORIGINAL ARTICLES.

THE EFFECT OF INTENSE FLASHES OF ELECTRIC LIGHT UPON THE EYE.

BY DUNBAR ROY A.B., M.D., ATLANTA, GA.,

PROFESSOR OF OPHTHALMOLOGY IN SOUTHERN MEDICAL COLLEGE.

WHILE the cases here reported occurred in my practice more than a year ago, they were recently recalled to my mind by reading Prof. Haab's article in the July number of *Klin. Monatsblt. für Augenheilkunde*, entitled "Traumatic Macula Changes Produced by Electric Currents." There have been perhaps more cases observed than have been reported of temporary injury to the eye through intense electric flashes, but the rarity of such reports warrants the present presentation which will at all events call attention to some of the lurking dangers of the electric lights.

CASE I.—Mr. E., aged 29 years, one of the chief superintendents for the city electric light company, consulted me in my office at 1 P.M., May 20, 1895. The history given was that about one hour previous, while trying to adjust some wires, two of them became crossed a short distance in front of his eyes with the result of a blinding flash of light. For a few minutes his vision disappeared, but gradually returned, leaving only a marked burning irritation in his eyes, the reason for the present consultation.

On examining both eyes, a marked pink zone of injected blood-vessel could be seen around the cornea. The conjunctiva of the lids was but slightly irritated. Pupils react normally to both light and accommodation. Vision in both eyes normal. He complained of only a smarting sensation about the lids and a slight amount of photophobia. The use of dark glasses, hot fomentations to the eyes and absolute rest for a few days was the only treatment advised. About 2 o'clock that night a telephone message was received saying that Mr. E. was suffering so much pain with his eyes that he desired me to come out immediately to his house. On arriving I found the eyes a little more congested than on the previous examination. He was then suffering with violent, aching pains in the eyeball. On a close examination of the cornea this was found to look a littly hazy, a condition which was not present at the office examination. There was marked photophobia. Several drops of a 2 per cent. solution of cocaine were instilled into the eyes and also a drop of a weak atropine solution. In about fifteen minutes the patient was perfectly easy and reported next morning at the office that he had remained so all night and was even now perfectly comfortable. On examination the cornea was clear and all signs of irritation had subsided. His eyes rapidly returned to their normal state. No changes could be seen with the ophthalmoscope, although the symptoms pointed to decided retinal irritation.

CASE 2.—Mr. M., aged 18 years, also an employee of the Georgia Electric Light Company. The history of this young man was almost identical with Case 1, with the exception that he was not seen until two days after the injury. An identical electric flash took place just in front of his eyes and he was also blinded for a few minutes. On recovering from the shock he bathed his eyes in cold water and with the exception of a slight irritation he experienced no discomfort. This iritation persisting, the Company sent him to me for examination.

R. E., V.=$^{20}/_{xxx}$. Improved by no glass. L. E., V.=$^{20}/_{xx}$. Decided ciliary injection in the right eye and very slight in the left. Pupils react normally but appear rather contracted. The cornea of the right eye appeared a littly hazy. By ophthalmoscopic examination I must acknowledge that nothing very abnormal could be discovered, although the region of the macula in the right eye may have looked a little cloudy. Neither in

this case nor in the first was any scotoma or contraction of the visual field to be found. The patient was ordered to wear dark glasses, use hot fomentations to the eyes and a drop of atropine solution was instilled into both. He had no further trouble and vision in both eyes became normal. The flash of light in both cases came from wires which carry a voltage of five hundred.

A few cases have been reported where intense electric flashes have caused a temporary blindness and where the pathologic lesion has been a grayish discoloration in the region of the macula lutea. The action of the snow upon the eyes producing the phenomenon known as "snow-blindness" is of no infrequent occurrence in the frigid zones and the pathologic conditions there found are quite similar to those seen in eyes which have been injured by electric flashes.

The subject of pathologic changes in the macula lutea due to traumatic causes was first given prominence in an article by Prof. Haab, of Zürich, at the Seventh International Ophthalmological Congress, held at Heidelberg. Since that time Prof. Haab and his associates have continued to study the subject and given at intervals further contributions relating to these traumatic changes.

In 1889, E. Meyer, of Zürich, delivered an inaugural address upon this subject, and in 1896, A. Siegfried of the same city, and out of the same clinic, published an extensive article upon "The Traumatic Changes in the Macula Lutea of the Retina."

Intense light as the cause of retinal and conjunctival changes has been known to careful observers for a long time. Electric light as a cause is of comparatively recent date and only since it has become so universally popular for domestic use. One has but to note the dazzling effect produced upon the eyes by the bright reflection from the snow or the same effect produced when we gaze unaided by tinted glasses upon the sun in partial eclipse to realize how irritating and blinding such lights are to our visual members. "Snow-blindness" has been known to ophthalmologists for years as also the blinding effect of the bright sunlight upon the eyes. A very interesting discussion of this latter subject with an abstract of all reported cases can be found in an article by Mackaye published in the *Ophthalmic Review*. He found that after exposure of the eyes

to the sunlight the patients notice a dark spot in the field of vision. This on examination is found to be a positive scotoma which lasts for a certain period of time and then passes away. Mackaye found that this also represented color-scotomata extending over a larger area. Such patients will often see objects twisted producing the condition known as metamorphopsia. The ophthalmoscope will sometimes show no changes while in others a decided hazy condition will be found in and around the macula occasionally with an accompanying pigmentation. Vision as a rule is reduced and when this is marked a perfect recovery rarely takes place. Pigmentation of the retina caused by the action of sunlight has been adduced by Monoyer as a cause for the condition known as "retinitis pigmentosa."

Deutschmann has shown by experiment that concentration of direct rays of sunlight upon the retina of a rabbit produces a coagulation of the retinal albumen with an accompanying pigmentation. However such an analogous condition could not be attributed to the sun. While the action of sunlight from the snow produces a decided retinal irritation it manifests its chief symptoms upon the eye by producing a severe conjunctivitis with sometimes a diffuse keratitis and ulcers of the cornea. It rarely leaves any bad results.

The effect of bright electric lights upon the eye has also been investigated and the result noted. Just what degree of brilliancy it takes to produce injurious effects upon the eye has not been definitely settled. It is true that the ordinary incandescent light certainly seems to be the best for illuminating purposes. It is more brilliant, produces less heat and therefore less particles of combustion, is steadier than gas and is the nearest approach perhaps to the daily sunlight. However, I must say that experience in the use of both the incandescent light and the Welsbach gaslight has influenced me in a preference for the latter. Of course the latter is more troublesome to keep and therefore has its disadvantages but when subdued by the use of white shades it certainly makes a most excellent light by which to work. Personally I have used this light for years and now prefer no other.

Hartridge, of London, in an article published in the *British Medical Journal*, 1892, on "The Effect of Electric Light Upon the Eyes," states that no bad results have ever been ob-

served upon the eyes from the ordinary use of the incandescent light. Although since that publication I have seen no other reports to the contrary, personal observation prevents me from agreeing with the author referred to. A case recently under my observation could be attributed to no other cause:

Mr. H., aged 24 years, night clerk in a hotel, consulted me last February on account of a slight irritation in his left eye. History was as follows: Physically he was a perfect specimen of manhood. He worked every night as clerk and book-keeper under the constant glare of the incandescent electric lights and slept during the day. Up to this time he had never had the least trouble with his eyes. Gave absolutely no history of syphilis nor could any signs be found on the closest physical examination. He had never been sick a day in his life nor had he ever had the slightest touch of rheumatism. Had never felt better than at the present.

On examination, left eye showed contracted pupil but no more than the right. It did not respond to light. There was only the faintest circumcorneal zone of congestion. Vision normal but photophobia was present. Right eye was normal. On using atropine in the left eye an incipient iritis was readily diagnosed. It was impossible to dilate the pupil *ad maximum*, although there seemed to be no points of adhesion. The iritic muscles appeared perfectly torpid.

The case proved to be one of prolonged treatment, although at no time were the objective or subjective symptoms severe. Nothing was used but atropine solutions, hot fomentations and blisters to the temple. Leeches finally produced a most rapid amelioration of the symptoms. In this case there was no doubt to my mind that the cause of the attack must be attributed to the electric light. He worked for hours every night with an incandescent drop-light just in front and to the left so that for hours there was a constant glimmer especially in the left eye. There was never any trouble with the right eye. Since that time he has had no further trouble as he was transferred after recovery to day duty.

In the last few years there have been a number of young ladies under my care for ocular troubles who were boarding in a large school where incandescent lights were used. I have had to stop some of them from school and in other cases I have substituted a student's lamp in place of the electric

lights with the most happy results. My experience has been that these incandescent electric lights are not suited for a light by which to do constant work.

Hewet, in the *British Medical Journal*, 1893, calls attention to a condition of the eye designated as *electric ophthalmia*. The symptoms of this disease are said to be the same as those of snow-blindness, viz., swollen lids and congested conjunctivæ, later followed by a muco-purulent discharge. This condition is usually found among those employed in electric welding operations, less frequently in those who use the arc lights.

Several cases have been reported of blinding or dazzling of the retina through intense flashes of lightning which show much similarity to those caused by electricity.

Prof. Haab, of Zürich, was one of the first to call attention to changes in the retina especially in and around the macula region from traumatic and constitutional causes in an article read before the Seventh International Ophthalmological Congress at Heidelberg, 1888, and in 1889 E. Meyer from the same clinic continued the study of the subject. These two writers discussed more in detail the vulnerability of the macula region to various causes rather than to any particular traumatic cause. Their subsequent writings seem more of a clinical demonstration of their views previously set forth.

In 1894, Dr. E. C. Rivers published a very interesting case in *Knapp's Archives* on "Injury to the Eyes From Heavy Charge of Electricity." This case condensed is as follows: H. E., aged 25 years, employed as engineer in the motor house of the Denver Electric Car Co., accidentally made a short circuit with a steel wrench in his hand causing the full 550 volts to pass through his arm and out at the wrench accompanied by a loud report and a very intense flash. The patient was stunned and immediately had severe pain in his eyes.

Rivers saw the patient one hour after the accident and found the following condition present: Face with eyebrows and lids, neck, and hand badly burned. On examining the eyes the conjunctiva was found strongly congested and the cornea of both eyes almost opaque Vision = perception of light. Under the use of atropine, castor oil and dry aseptic cloths, the eyes progressed well.

On the third day the whole eschar on the cornea was

thrown off and this being only the epithelial membrane the remainder was left clear. A few days later, L. E., V.=$^{20}/_{XL}$; R. E., V.=$^{20}/_{CC}$. The ophthalmoscope showed the media clear. The retina in the right eye looked hazy. Visual fields normal for all colors. Six months later the patient reported that he still suffered with photophobia and has to wear colored glasses. Is compelled to look very intently in order to see small objects. In my own cases the flash was not near enough to produce burning of the tissues.

Dr. L. D. Broose, of Evansville, Ind., has reported two cases of retinal irritation from electric flashes which correspond more in detail with my own:

J. H., aged 28 years, an employe of an electric street railroad, accidently received a shock from one of the trolley wires and at the same time the eyes were subjected to a very intense flash of light. When seen five hours later the conjunctival vessels were found injected, the eyes suffused with tears, pupils contracted and patient suffering with intense pain. None of the parts were burned. Patient was directed to stay in a darkened room and a 2 per cent. solution of cocaine was used in both eyes. In twenty-four hours he was able to resume work.

F. W., aged 24 years, also an employee of an electric street railroad, struck a live wire with a file which he held in his hand and immediately there was an intense flash and the patient rendered unconscious, this latter condition persisting but for a short time. When seen a few hours later the patient was complaining of severe pain in his eyes. The ball and lids were found markedly congested. Pupils contracted. Treated in the same manner as the first patient and in five days the patient was able to resume work. The ophthalmoscope showed nothing abnormal. No mention was made of the field of vision.

In the Transactions of the American Ophthalmological Society for 1896, Oliver has reported a very interesting case of traumatic injury to the retina from a severe flash of lightning. This is somewhat similar to Haab's recently published case.

Oliver's case was as follows: A man, aged 20 years, who was being treated for asthenopia at the clinic, while crossing the street one day during a thunder storm was suddenly blinded by a flash of lightning which seemed to strike the earth just in front of him. For a few seconds he was com-

pletely blind, but in about two minutes the sight returned first in the left and then in the right eye. On the next day while at his work (copper engraver) he noticed at his fixation point a small, round, cloudy and grey spot, moving around with his eyes. This central scotoma changed its form into various phantastic figures. At first this was only in the right eye, but eleven days later it appeared in the left with the same moving forms. Four months later the central positive scotoma in the right eye was unnoticeable but the vision remained disturbed, being only one-half. In the left there remained a very small, central spot, not movable, but the vision was normal since the scotoma was a little beneath the fixation point. In about one and a half years these disturbances had reached their minimum. The ophthalmoscope nine days after the accident showed the following: R. E., in the macular region the retina in a circle appeared to be swollen. The tissue itself appeared neither changed in color nor opaque but here and there was an appearance as if a very thin layer of jelly had been placed beneath the retina. Nowhere were there hæmorrhages or signs of degeneration. The discs on both sides appeared a little more indistinct and grayish than the eye of the patient would indicate. In the left eye the macular region at that time appeared normal. It showed, four months after the accident, somewhat under the middle, a small hæmorrhage between the retina and choroid, and about eight months after the accident similar changes were present as in the more affected right eye namely, an irregular spot about half the size of the disc bordered by a bright rim, while in the right eye a similar bordered spot was seen of about double the size of the disc and pigmented.

Prof. Haab in commenting upon this case of Oliver's calls attention to the fact that neither in this case nor in the one reported by himself were there any signs of opacity of the lens.

In individuals struck by lightning cataracts are known to have formed as a result of this injury. This subject has been well studied by Prof. Hess, of Marburg, who has made experimental investigations regarding not only this but also other forms of cataract.

Prof. Haab, in the July number of the *Monatsb. f. Augenheilkunde*, discusses anew this subject and reports another case whose clinical study presents some features of interest. As

this article has not appeared in English I will take the liberty here of making an abstract of the report:

H. W., aged 34 years, machinist consulted Prof. Haab on August 9, 1895, concerning his eye which has received a flash of light from a dynamo of about 60 ampères. He came the same morning immediately after the injury because of the dimness of vision noticed, especially in the lower field. He was stunned by the flash of light which was very near the eyes and for a few movements he could see nothing. The right eye being nearer to the dynamo than the left it was the most affected. The pain was severe in both, just as if needles were sticking them.

Examination: There was only a slight irritation with some hyperæmia of the conjunctiva in right eye. Both pupils contracted, the right more than the left. The irides appeared normal. R. E., V.=$^{3}/_{XVIII}$; no improvement with glasses; R. E., V.=Normal. The ophthalmoscope showed nothing abnormal. On the next day the condition was decidedly better. R. E., V.=$^{3}/_{X}$ w. — 0.5 D.=$^{3}/_{VI}$. On dilating the pupil the left eye showed nothing abnormal. In the right eye a very interesting condition was present:

1. Extending over the whole macular region there was a very fine milky discoloration so that the normal granular appearance was absent. In the deepest part of the macular center the discoloration was slightly less. A similar milky discoloration was nowhere else present in the retina.

2. Running along the periphery of the retina could be seen a few yellowish-white spots of irregular form and size about once or twice as broad as a large branch of the central artery. * * * Some spots existed also below the fovea, the latter being quite fine. In the middle of the fovea two very small bright specks were found. Whether these small spots were in the retina or in the pigment epithelium could not be determined. However they were nowhere as white as those found in diabetes or albuminuria. Along the retinal vessels and on the papilla nothing abnormal could be seen. The lens and vitreous were normal. The treatment consisted in absolute rest and the wearing of dark glasses.

August 16. R. E., V.=$^{3}/_{VI}$ w. + 1 D; L. E., V.=normal. The macula is still slightly opaque.

October 13. The eye appeared normal No signs of cataract.

These cases as well as the subject itself are of interest to the ophthalmologist as affording clinical data upon which to base a prognosis whenever such accidents should come under his own professional care. Since electricity has become so universal in domestic use accidents referable to it as a cause will necessarily be more common. The prognosis in all diseased conditions is determined by clinical experience and hence the greater the number of cases reported the more certainty there is for a basis of deduction. The writer of this article does not lay claim to any original investigation but purposed to bring forth from others their own personal experience. In the study of the cases above reported there are many points of interest involved and chief among them as to whether the changes produced in the eyes had a chemical or a traumatic basis. This point certainly opens up an interesting field for investigation.

Another point to be noted was the universal presence of two symptoms in all the cases, viz.:

1. The contraction of the pupil from the retinal irritation which was so strong that this contraction persisted for days.

2. The pain, which always came on several hours after the accident.

CAN WE PREVENT COLOR-BLINDNESS BY EDUCATION OF THE COLOR-SENSE IN INFANCY?

BY L. R. CULBERTSON, M.D., ZANESVILLE, OHIO,

OCULIST TO U. S. PENSION BUREAU, CITY HOSPITAL, ETC.

THE reading of an article in the *Pittsburg Dispatch* of October 10, led me to the above query. The article was written by the noted correspondent, Frank G. Carpenter, in an interview with the scientist, Prof. E. L. Gates, Director of the Laboratory of Psychology and Psychurgy, Washington, D. C. I copy from his article that portion which bears on the above subject:

"He was much interested in his story of how he first came

to the conclusion that our brains could be added to and built up. When he was a boy he realized that the mind was the most important thing in the universe. At the age of 14, he says, he began to experiment upon himself.

Keeping a Personal Record.

"For two years he kept a record of all that he saw, felt and did. He had a book in which he recorded four times each day just what the climatic and other conditions about him were. In another column he put down his physical condition, stating just how he felt, measuring just how much he ate, and, in short, all that he did that would affect his physical state. In the third column he recorded his mental conditions. At the end of two years he went over the record and generalized it. He found that under certain conditions his brain was more active than under others, that he could write better at such times and that his inventive faculties were more active. After this he worked only under such conditions, and found that he could produce twelve times as good results as before. He soon began to see that his work was getting better and better, and later on began a systematic study of the brain development.

"One of the first experiments was as to the building the brain of a dog. Said he: I wanted to see what effect mental activity has upon the brain, and it struck me, if I could take a certain number of puppies and keep them from their birth in absolute darkness, and at the same time take another set which should be trained in seeing and have plenty of light, that upon comparing the brains of the two I could tell whether the use of the seeing power had changed them This I did.

Experimenting With Puppies.

"I took seven shepherd puppies and kept them in a room until they were nine months old. The room was completely dark. It had triple doors, so that the mother could go in and out without allowing the light to enter the room. When the front door was open and the mother was let in, the doors were closed behind her and she was allowed to remain there some minutes. Then the second door was opened and she was kept there a few minutes, and then allowed to go into the room where her children were. I kept the puppies there for nine months

without light, and then killed them by the use of chloroform. I took out their brains, eyes and spinal chords, and put them aside for microscopic and chemical examination. At the same time I had another group of puppies which I allowed to lead the life of the ordinary dog, giving them no special attention. I chloroformed them when they were nine months old and preserved their brains for examination.

"In addition to these two I had a third group of the same kind of puppies which I put through a course of training in seeing. I had one of the rooms of my laboratory covered with squares of metal, each square being insulated from the other. To some of the squares I attached an electric battery and arranged them so that the moment a dog touched one of them he would receive a shock.

Dogs Could Distinguish Colors.

"These squares had one color. The other squares, which were not affected by the electricity, had another color. I soon taught the dogs to discriminate between the squares by the colors, and in this way actually taught them to know colors. For instance, I had one pan or pen the bottom of which was covered with tin painted white. Around this I ran a black border of metal, which was connected with the battery. After a few days you could not get the dogs to touch that border or anything black, but you might lay a white strip across the black, and they would walk over it.

"I also taught them colors by feeding them, placing the meat under pans of a certain color, scattered about among pans of other colors. All of the pans were rubbed with meat first to prevent the dogs from picking out those with the meat under them by the sense of smell. The dogs would go to the right colored pans every time. After awhile I changed the meats to different colored pans on different mornings. The dogs soon learned to recognize the change, and there was one of the dogs who would turn over all the pans until he came to the first one having meat in it, and after that he would turn over only pans of that color. The dogs, in fact, learned to surpass many of our artists in their discrimination of colors. They could distinguish seven shades of red and about eight of green.

Effect Upon the Brains.

"Well, at the end of nine months I killed this set of dogs, and then compared the brains of the three sets. I found that the dogs who had been kept in darkness had no brain-cells in the seeing areas of their brains. The dogs that had been allowed to run about had well-developed brain-cells, just as you will find in the ordinary dog of that age. But I also found that my trained puppies had a much greater number of such cells, and that their cells were more highly developed. I found, in short, that by educating the dogs I had added to their brains. I tried the same thing on other dogs as to hearing and also as to training of the muscles by making the dogs produce certain leg motions, and found that this produced similar results on the brain. I practiced similar experiments upon monkeys and rabbits as to colors, and I made a large number of experiments upon guinea-pigs, running through several generations, to see the effect of heredity upon brain development. The result is that I have no doubt but that man can not only develop the brains he has, but that he can actually add to them and build up new brains along such lines as he desires."

"Have you evidence that any such work would readily affect the brain of a human being?"

The Professor's Bright Baby.

"Yes, I have tested it in many ways. I have a baby, for instance, who will discriminate more than a hundred thousand different shades of color, and who has been specially trained in seeing, feeling and in other ways. I believe that we have eight senses, you know, instead of five. We see, we hear, we smell, we taste, we touch. We also have a sense of cold and a sense of heat, and also a sense of muscular action. All of these senses are based upon thought. They are controlled by the mind. The use of them acts upon the mind. Every time you use one of them a certain set of cells in the brain is changed, and by their use you can build up a new set of brain cells. Unless all of these senses are used your brain will be unevenly developed, and some parts of it will not be developed at all. In training my child I

tried to make him use all of his senses. I taught him the senses of heat and cold by the use of hot and cold baths, graduated from cool to warm. I also used rubber gloves, connected with the water supply, and, as a result of this, I believe his brain will be stored with memories of all the degrees of heat and cold he is likely to have in life, and I think he will be able to endure the differences of temperature. He is now two and a half years old, and he has never been sick but once and then he had the measles.

"Prof. Gates showed me the boxes of blocks with which he taught his child the different geometrical shapes. He has whistles with which he taught him sound, so that he can now distinguish scores of different pitches. He has bottles containing different liquids, each having a different smell. These bottles number 1,500, so that he may really be said to have 1,500 different smells bottled up. His baby at ten months could distinguish 50 different tastes and 30 different smells. While we were talking the baby came into the laboratory with his nurse. He looked to me as happy and healthy as any child could be.

Lessons Are Very Brief.

"Prof. Gates tells me that his experiments in teaching him never last more than five minutes at times, and that the child really likes them. He also said that a child who had been trained for six weeks after birth in the excessive use of the heat and cold senses was found, after dying of scarlet fever, to have in the temperature areas of the brain more than twenty-times the average number of cells.

"I asked Prof. Gates when brain building should begin.

"He replied that it should really begin in the father and mother before the child was born, and that the child within a week after birth should begin its brain development.

"Prof. Gates says that his experiments show that men can really work their brains over and make them new. They can rebuild them, and can make them do original thinking for them along any line that they choose. I had my photographer with me during my call at the laboratory. Prof. Gates pointed to him and said: 'I can take that man, and, within a year, if he will follow out my directions, I can have him making new discoveries and inventions in photography. I would first teach

him how to control his mind and how to use it in the direction of his work. I would gradually lead him to original thinking, invention and discovery. I would have him to take the sum of accurate human knowledge in photography and would teach him how to work from that on through to new ideas. He would first exercise everyone of his thirty or forty mental functions upon each proposition of the science. This would keep each faculty active for a certain number of hours every day. The parts of his brain which he needed to deal with the subject would grow, his sub-conscious functions would become stimulated, and new ideas would dawn upon him.'

Quadrupling the Mental Power.

"I have found that six months' practice along the lines which I lay down usually quadruples the mental capacity of a man, and more than quadruples the number of ideas gained each day. Of course, such ideas have to be tested by observation and experiment as to their correctness. Take this microscope, for instance. The wonderful thing about it is not the discovery, but it is the art of mind-using and mind-building which I have used which has resulted in the discovery."

* * *

The above has opened a new field for thought and study, *i. e.*, as to whether color-blindness can not be overcome by education of the color-sense. Authors state that 5 per cent. of the population are color-blind. What a boon to humanity if this could be reduced to even 2 per cent. Ophthalmologists see daily the disappointment of men who desire to follow a certain occupation but are debarred from doing so because nature has given them a defective color sense.

Following Prof. Gates' line of thought I would suggest that ophthalmologists experiment on cultivation of the color-sense of children of color-blind parents and endeavor to develop the color-perceiving brain centers. I would also suggest that parents be instructed by competent physicians or oculists in the use of Holmgren wools or other color tests and let them daily educate their children in matching and recognizing colors. A good method would be to have duplicates of the different shades and if the children are old enough to understand, tell them to find the mates and then tell them to name the

shade. The name through the association of ideas will assist to fix the color in their memory. Further experiment will teach us the best method of educating the color-sense.

The kindergarden would be an excellent place for instruction, or the primary grades of public schools. Probably difficulty will be encountered in color blind children who will put confusion colors with certain shades.

I would suggest an experiment that might teach us how to overcome this. Ascertain the color which confuses the child. Say it is green-blind. Then take blocks of wood and coat them with sand and glue or sand-paper. Let the sand be coarse. Then paint the various shades of green on the different blocks over the sand. Then have another set of blocks on which is a finer grade of sand. Paint these the various shades of drab. If the subject be red-green-blind—I mean if they call red, green—also have another set with still coarser sand thereon, painted the different shades of red. Then give the subject a green block and tell him to match it. He will put a drab with it. Then tell him to feel it and ascertain if it *feels* like the other color. He will say no. Then tell him to pick out from the other set one that *feels* like the one he has. He may not get the same shade but he will not confuse the color as he is partly or wholly guided by the sense of touch. (The blind can tell colors by the sense of touch). Now at the same time that the touch perceives that the green block feels coarser than the drab, the *neuron* or nerve-cell for the sight-perception of green will have another cell (or idea) to guide and reason with it through the sense of touch thus showing its color. In this manner a new cell will form or be developed which will be connected with the cell which perceives the green shade through touch and the cell which perceives the green shade through sight. The grey-perceiving cell will then respond to the different light-wave length of grey, and grey be perceived as grey. When the grey-perceiving cell has become fully developed it will not need the touch to assist it.

Another assistance might be to have toy animals of different colors. Say we have cats painted different shades of green and dogs different shades of grey, and if red-green-blind, cows of different shades of red. Then mix all animals together and have them assort them. This would assist them through the

form-sense but would be of more benefit after the color had been acquired through the colored sand-block exercise.

I do not say that color-blind children can be taught colors by the above theory. I merely offer the above as a suggestion for experiment by some of our ophthalmologists and others.

The question is one of the deepest interest to us as well as to suffering humanity. If it can be solved it will enable many a man or woman to attain eminence in a trade or profession from which they would be debarred if color-blind.

The same line of reasoning may lead to the discovery of a method to teach children whereby tone-blindness (deafness to pitch of tones or "false ear") may be overcome.

OPERATION INTENDED AS SUBSTITUTE FOR EXTIRPATION OF LACHRYMAL GLAND OR DUCT.

BY JOHN JOHNSON KYLE, M.D., MARION, IND.

RESEARCH in the past few years into the bacteriological products of the conjunctiva and lachrymal duct has revealed a variety of micro-organisms which are of interest to the ophthalmologist.

It was but yesterday that the nasal, as well as the conjunctival mucous membranes were supposed to be aseptic. To-day we find these mucous membranes covered with micro-organisms which have been classified and their functions partially explained. Prominent among those who have made systematic and painstaking efforts in this direction are Sattler, Michael, Koch, Weeks. While later Professors McFarland and Knies, in "System of Diseases of the Eye," Vol. II, (Norris and Oliver) and likewise Victor Morax and George William Beach, of Paris, have at different times contributed interesting and comprehensive articles upon bacteriology of the conjunctiva. "The bacteriological study is far from being completed," however the ground is sufficiently covered to enable us to diagnose and classify conjunctival inflammation from bacteriological rather than pathological appearance. Occlusion of the duct is due to congenital stricture, extension of a diseased

condition of the mucosa of the nose, or inflammation within the duct itself.

There is no age at which diseases of the lachrymal duct may not occur. The youngest operated upon by me was a babe six weeks of age, the child suffering from dacryocystitis, due to stricture of the duct near the nasal opening. The punctum was slit and a probe passed into the duct. The duct was syringed daily for two weeks, when the little patient made a complete recovery.

In the young the retained secretion may bulge the lachrymal sac and find ready exit through the puncta. In other cases the sac may rupture, forming phlegmonous dacryocystitis. In my experience the disease is usually confined to one side. The puncta and canaliculi are subject to a number of congenital anomalies. For instance, we find a number of small openings into the canaliculi; again we find a slit or one or two openings with a slit or *vice versa*. It is not my purpose to consider the treatment of the different diseases of the sac or duct, other than the consideration of the following operation, which to me is new—if not, my confrèrers may set me right.

It has been my experience and observation that in many cases of chronic stenosis, even when the probe is passed and the style worn for months or years, upon removal, which patient often demands, there is an immediate occlusion of the duct, and not unlikely, a probe can not be reinserted, or if so,

only with great difficulty. In old chronic cases it is often necessary to perform extirpation of the lachrymal gland. To avoid the radical operation of extirpation of the lachrymal gland, the following operation, performed a number of times by me with good results, I think is simpler, and following a natural course. The lachrymal bone at the junction with the superior maxillary bone is very thin and fragile, and being vascular, is easily passed through. With this in mind the canaliculus is slit and carefully dissected to the osseous opening of the duct as shown in the accompanying figure. Now taking a small Krause trocar, this is passed into the opening making firm pressure downwards and inwards. The trocar thus passes through the lachrymal bone into the nasal cavity under the superior turbinated bone. There is but little hæmorrhage following the operation, which can be done under cocaine. A short silver canula about ten millimeters long, with short narrow lips bent at right angles is now passed into the new opening, and the wound carefully treated until all inflammation has passed away. The advantage of a short tube lies in the fact that we avoid the accumulation around the tube of the thick viscid secretion which is thrown off from the turbinates. This secretion clings in great masses to the tube and makes removal for cleansing very difficult. A short tube remains quite as well in position. Healing readily takes place around about the opening, and the patient has no difficulty in removing and reinserting the tube. This is a great advantage over the old styles worn in the natural duct, in that, as a rule, it requires an oculist to replace the canula after it has been once removed. In old cases of dacryocystitis the epithelial lining of the sac is thoroughly diseased. With a transfer of secretion to a new channel the walls gradually unite from proliferation of epithelial cells, thus completely occluding the old duct. By careful attention to the anatomical structure and a knowledge of any abnormalities of the middle turbinated bone, the operation can be performed without danger of injuring accessory cavities.

CASES FROM THE CLINIC.

BY HENRY DICKSON BRUNS, M.D., NEW ORLEANS, LA.,

PROFESSOR OF DISEASES OF THE EYE, NEW ORLEANS POLYCLINIC; SURGEON-IN-CHARGE OF THE EYE DEPARTMENT, EYE, EAR, NOSE, AND THROAT HOSPITAL, NEW ORLEANS, LA.

Discission of Pupillary Membrane and Iridotomy With the Graefe Knife.

Case I. — (21198). A white gardener, aged 77 years, whose left eye had been unsuccessfully operated on for cataract in May, 1894, presented himself at the clinic in March, 1895. V., R. E.=l. p., from partial cataract; L. E.= l. p. In the left eye the pupil was occluded and the iris much distorted; so bound down and incorporated into the occluding mass of lymph and capsule as completely to shut off any communication between the anterior and vitreous chambers.

March 6. The left eye being thoroughly cocainized an iridectomy was done at right angles to the direction of greatest tension of the iris fibers in the following manner: A narrow and sharp Graefe knife was passed through the cornea at its inferior portion about 2 mm. from limbus and its point and about one-third of the blade plunged obliquely through the iris into the vitreous at the point destined to be the upper end of the false pupil; the knife was held perfectly steady and no lateral deviation allowed. This done the knife was rotated carefully around its short axis in such a way as not to enlarge the corneal wound while using it as the fulcrum, pivot or axis of rotation. By this motion the point and portion of the blade passed through the iris was made to cut and carry the tissue of that membrane before it. The handle of the knife traveling towards the forehead had now described more than 100° and the iris was lying crumpled and folded over the blade; then, without changing the direction of the knife and again carefully avoiding any enlargement of the corneal wound, the knife was slowly withdrawn and cut well and clearly through the iris, drawn tense against its keen and slanting edge. A perpendicular slit, about one-sixth of an inch long, at right angles to the

line of iris tension, had now been cut completely through the thickened membrane. This at once expanded into a lanceolate (cat's eye) pupil as the result of the pressure of the vitreous and the retraction of the iris fibers. A little blood escaping from the wounded iris in a few seconds obscured all view of the field of operation and obliterated the momentary vision that had been obtained. Only a trace of aqueous had escaped and the anterior chamber seemed normally full. Atropine was instilled and a protective bandage put on.

March 12. In six days all the blood had been absorbed from the anterior chamber, the false pupil retained its original shape and size, and a clear view of the fundus could be had with the ophthalmoscope. The vision with + 12 s.=$^{20}/_{cc}$, but the patient old, stupid and a foreigner could not understand or make himself understood. The vision was certainly amply sufficient for all practical purposes.

CASE II.—(26410). White farmer, aged 72 years, who had a cataract extracted from left eye last April, came to the clinic January 15, 1896. He is robust, old, a foreigner and stupid. In the left eye the iris is much distorted and the displaced pupil is blocked with lymph and the remains of the lens capsule. In each eye (he has an almost ripe cataract in the right eye) the V.=l. p. Under cocaine a free discission of the occluding membrane is made with a Graefe knife by the "somerset" operation above described. Immediately fingers are counted at a foot or more. The iris has been touched by the knife, however, and bleeds freely; in half an hour vision is much obscured by the blood in the anterior chamber. Atropine is instilled and a pressure bandage applied.

January 16. The blood is gone from the anterior chamber and the pupil looks black, but he does not see.

January 17. Faint red reflex from the fundus. Instillations of borax and camphor water are ordered.

January 21. L. E., V. = finger counting at one yard.

March 3. + 8 s. seems to give the best vision, but it is impossible to gather from him exactly what he does and does not see. However, he gets about well with these glasses on and is advised to wear them for three months and then to see if his local optician can improve on them.

CASE III.—(32503). White man, aged 44 years, a clerk by occupation, came to the hospital May 18, 1896. He says

that he has little vision in right eye, which has been failing for the last eight months. He had a cataract extracted from left eye two years ago, but the sight has been failing again for about four months. His general appearance and health are good R. E., V.=l. p.; L. E., V.=$^{20}/_{c}$ (with glass).

August 6. The pupil of left eye being well dilated under cocaine, the membrane is freely discised with a Graefe knife by the "somerset" method. With a glass V.=$^{20}/_{xxx}$. The iris has not been touched and there is no bleeding.

August 13. L. E., V. w + 11 s.=$^{20}/_{xxx}$; with + 14 s.=Sn. No. 1.

I am convinced of the superiority of this method of discission in the majority of cases. Loring used the Graefe knife (Noyes' Text-Book), but by thrusting through the cornea and obstruction and sawing; but many cases, particularly when we have to deal with very tenuous membranes, can not be discised in this way. The danger of the "somerset" operation is dragging upon the ciliary body and where this is found to be inevitable the method must be abandoned and some other chosen. The possibility of discising occluding membranes with none and of making iridotomies with but very little hæmorrhage or loss of aqueous is of incalculable advantage in thase cases. The immediate application of a firm pressure bandage (Fuchs) by retaining the aqueous, increasing the tension and so restraining bleeding, and keeping the vitreous pressed between the lips of the new-made cut does much to ensure a good result.

Leprous Iritis.

Case I.—(36864). A white man, aged 65 years, a private watchman, came to the hospital March 16, 1897. He describes his general health as poor. The skin of the face has the characteristic, semi-translucent, coppery discoloration and is thickened over the brows, in the ear lobes, and the usual situations. The countenance is leonine, the eyebrows scanty, the lashes gone, the fingers ulcerated. The diagnosis (leprosy) is indubitable. Right eye is red from a marked ciliary injection, the iris looks thick and dull, the pupil is small, unresponsive, bound down; it is rather painful. V., R. = fingers at ten feet; L. = $^{20}/_{lxx}$. Atropine is freely instilled and hot applications are ordered. At the end of four or five days there was no change in the condition and the patient ceased to visit the clinic.

CASE II.—(35584). A white man, aged 49 years, a shoemaker, who describes his general health as good but is evidently a leper, applies for treatment December 3, 1896. About a week ago the sight of left eye began to fail with but little pain or redress. Now vision of this eye = counting fingers at four feet; there is moderate ciliary injection and T. = + 1. A strong solution of atropine is repeatediy instilled at the clinic and a mercurial purgative is ordered at bedtime.

December 8. Marked improvement. Atropine is repeatedly instilled at the clinic every day.

December 10. A week after admission he is discharged cured; V., L. E.=$^{20}/_{XXX}$; Tn.

These cases are described on account of their rarity at most clinics in the United States. The iritis is usually of moderate grade, but there are nearly always persistent posterior synechiæ; the iris is markedly dull-looking and pain is not a conspicuous symptom. Very often the conjunctiva near the cornea is infiltrated with the leprous material and leprous tubercles are not uncommon on the iris. While the first attack is as a rule readily relieved relapses soon occur and the prognosis is absolutely bad; the cornea becomes dull, the conjunctiva dry and atrophic, the iris extensively bound down, the pupil occluded and the lens opaque. I have observed all my cases in the tubercular or mixed tubercular and anæsthetic form, the one usually seen here. This cause of iritis is not mentioned by Noyes (1890), is not in the table of etiology given by Fuchs (1892) p 285, nor by Norris and Oliver (1893).

EPITHELIAL HORN AT TEMPORAL EDGE OF UPPER LID.

CASE I.—(35657). A white man, an Italian, aged 35 years, of good general health, presented himself at the clinic December 9, 1896. He has noticed a growth at the outer edge of his eyelid for two years. This growth is an epithelial horn about one-fourth of an inch long and about the size of a crow-quill at its base tapering to a point. It springs from the skin just above the line of eyelashes and depends slightly. It was removed by a snip of the scissors, a single point of fine suture put in and glutol dusted over the wound.

December 10. There is a little suppuration around the suture; re-dusted with glutol.

December 11. Healing complete; stitch is removed; scar imperceptible.

Not only are horns on the eyelid sufficiently rare—I have observed only one in 12,000 odd cases—but I desire to call attention to the glutol of Schleich as an admirable dressing for slight wounds of the eyelids and neighboring parts. In many small operations such as incision of chalazia, snipping off warts or other benign growths, etc., the insertion of even a single suture is usually more painful and tedious than all the rest of the operation, performed as it may be by a single quick cut or scissors snip. In Schleich's glutol we have an excellent adhesive antiseptic dressing which entirely obviates the necessity of suture in wounds half an inch or less in length. When bleeding has stopped the powder dusted upon the oozing surface forms a firm elevated scab. If this be left absolutely untouched by the patient it will drop off in the course of a day or two leaving a clean linear cicatrix which rapidly becomes almost invisible to the naked eye. Recently I removed by a single snip of the scissors a xanthelasma from the upper eyelid of a lady; the lanceolate raw surface was not quite three-fourths of an inch long by almost one-half of an inch wide. Had I have been obliged to seize the edges of the wound with forceps, make two or more needle punctures and draw through and tie one or two points of suture, not only would I have been obliged to use more than double the time of operation, but I should have greatly added to the alarm and nervous irritation of the patient. Instead, I dusted the surface until a glutol scab about one-fourth of an inch in thickness was formed. This I abjured the patient to refrain from washing or touching and in four days it fell off leaving a fine line of scar that could not have been surpassed by the most accurate coaptation by suture. These minutiæ are worth observing particularly in our private practice; the infliction of pain is a constant source of irritation to the sympathetic surgeon.

Hyperplasia of the Subcutaneous Connective Tissue of the Eyelids.

Case I.—(22·33). A mulatto girl, aged 18 years, married, came to the hospital June 8, 1894. V., R. E.=$^{10}/_{cc}$; L. E.=$^{20}/_{xl}$. She says that eleven years ago she had a sore head and lost

her hair, "then all the skin around her mouth got sore, and then the eyes became as they are now." Both eyes are half closed by the drooping upper lids and at a short distance the eyelids and neighboring skin look as though they were very œdematous; the edges of the lids are sore and on eversion of the lids, which is somewhat difficult to perform, conjunctival hyperæmia is noted, which is said to be chronic. Close examination shows that the condition is not due to œdema but to a general hyperplasia of the subcutaneous connective tissue of the lids and neighboring skin. The other parts of the eyes seem to be healthy. The defective vision is due to conical cornea and it is not improved by any combination of glasses. I have never seen a case at all similar, but I believe I have somewhere read a description of one, though just where, I can not now recall.

Sympathetic Inflammation and Irritation.

Case I.—(23122). A white sailor, aged 32 years, came to the clinic July 27, 1894 V., R. E.=0; L. E.=$^{20}/_{xx}$. When a child, more than twenty years ago, a bit of gun-cap penetrated the right eye. For the last ten days it has been red and extremely painful, and there is incipient irritation of the left eye.

August 1. Right eye was enucleated. The piece of gun-cap was found imbedded in a calcareous mass, probably the remains of the lens; the retina stretched like a cord from the papilla to the site of the foreign body and the eye was filled with a bloody fluid.

August 22. He was dismissed entirely relieved.

Case II.—(23696). A white girl, aged 8 years, was brought to the clinic September 3, 1894. Both eyes totally blind and much disorganized. On February 14, last, about six and a half months ago, she stuck the point of a pocket knife into the ciliary region of the left eye. Two months later the right eye became inflamed and was soon lost.

Case III.—(23738). White man, aged 53 years, was led into the clinic September 6, 1894. He says that in 1864 a bit of musket-cap flew into his right eye. The left eye remained good until 1890, twenty-six years after the accident, when it began to fail. Now he is absolutely blind in both. In right

eye there is a pigment patch at the outer margin of the iris and the subjacent lens is opaque, the remainder being clear; the left lens is partially opaque. The fundus can not be seen in either eye, there being no reflex even from the left.

CASE IV.—(24614). A negress, aged 39 years, comes to the clinic November 6, 1894, suffering severely from the right eye which she says has been bad for three weeks. There is no wound and she gives no history of injury, but the eye is evidently in a condition of panophthalmitis; V., R. E.=l. p.; L. E.=$^{20}/_{xxx}$. There is marked sympathetic irritation of left eye. The right lid is everted, the conjunctiva swollen and the cornea destroyed.

November 14. The right eye is enucleated.

November 22. The patient is dismissed entirely relieved; V., R. E.=$^{20}/_{xx}$.

CASE V.—(24621). A negro shoemaker, aged 51 years, applied for relief November 8, 1894. Twelve days ago he was wounded with a fruit-knife. V., R. E. = $^{20}/_{xxx}$; L. E. = l. p. There is a cicatrix of the upper and lower lids, the result of a cut which evidently laid open the ciliary region of the left eye. The left eye is inflamed and there is pronounced sympathetic irritation of right eye.

November 14. Left eye was enucleated. Healing progressed without an untoward symptom and the patient was discharged relieved November 23.

CASE VI.—(25328). A negro laborer, aged 24 years, came to the hospital January 3, 1895. His right eye was wounded two years ago, but gave no trouble until two days ago. The eye is injected with a cicatrix of the ciliary region. There is irritation of the other eye. V., R. E.=0; L. E.=$^{20}/_{L}$ (with atropine).

January 10. Right eye was enucleated and the patient never again returned to the hospital.

DIPHTHERITIC CONJUNCTIVITIS.

CASE I.—D. G., a white child, aged 2 years, was brought to the clinic on March 25, 1897. He was said to have had sore eyes for five days. The child was languid and feverish; he lay back in his mother's arms with his eyes closed noticing nothing. He did not by any means, however, appear very ill.

The lids of the left eye were dusky red and much swollen; on pulling them apart a thin muco-purulent secretion escaped; on everting the upper lid the mucous membrane was found thick, velvety, red. The surface of the palpebral conjunctiva was covered with a thin whitish pellicle, which the physician who took charge of the case tells me, persisted until the defervescence of the disease, re-forming rapidly after any removal. The conjunctiva bled readily. The right eye was blood-shot and watery but not inflamed.

The general symptoms were thought by the parents to be due to the inflammation of the eye, hence the presence of the patient at my clinic. A culture-tube was inoculated with the secretion from the left eye and immediately sent to Dr. P. E. Archinard at the Bacteriological Laboratory. Drops of borax, boracic acid and camphor water were prescribed, to be instilled often enough to keep the eyes perfectly clean.

March 26. A report was received from the bacteriologist that the characteristic bacilli had been found and that the case was therefore one of true diphtheria. I at once communicated this to the mother aud advised that the child be inoculated with antitoxin. The Board of Health flagged the house and took the necessary sanitary precautions. On the evening of the same day the child was injected with 1500 units of Mulford & Co.'s (tested by Laboratory) antitoxin by Dr. J. J. Archinard, who informs me that no local treatment was used except the above-mentioned drops and that recovery was complete in six days. In three days the membrane had ceased to reform and the child was discharged practically well.

This was by far the most pronounced case of the disease I have seen here. I reported to the Orleans Parish Medical Society (*New Orleans Medical Journal*, July, 1896) three cases of this disease interesting on account of their exceeding mildness and as demonstrating the efficiency of the antitoxin treatment. For these reasons I believe they will bear repetition. The cases are as follows:

CASE I.—M. A., white female infant, aged 16 months, was brought to my clinic December 27, 1895. She had been unwell for a week with a sudamina-like eruption on skin and eyelid; for three days the left eye has been sore. There is a mild conjunctivitis with a slight watery, mucous secretion, and when the lids are everted they are seen to be covered with the thin,

whitish pellicle not uncommon in catarrhal conjunctivitis. A diagnosis of "conjunctivitis, acute catarrhal (croupous or membranous") is made, and as a matter of curiosity and extra-clinical caution a diphtheria culture-tube (diphtheria was then prevailing in our city) is inoculated and sent to Dr. P. E. Archinard, the bacteriologist of the State Board of Health. A solution of silver nitrate, five grains to the ounce, is painted on the everted lid and a 1 to 1000 solution of formol ordered dropped frequently into the eye at home. Neither I nor any of my assistants had the slightest suspicion of the diphtheritic nature of the affection.

December 30. Dr. Archinard reports the case one of true diphtheria; the culture has developed an abundance of pure Klebs–Löffler bacilli.

December 31. The next visit of the patient 5 cc. of antitoxin (Dr. Hans Aronson's) are injected subcutaneously.

January 2, 1896. Nothing having been done meanwhile beyond keeping the eye clean with formol solution, there is great improvement. A few drops of a one-half grain to the ounce silver nitrate solution are instilled.

January 4. There are no remains of the membrane (pellicle). Some zinc ointment is ordered for the few eczematous little sores on the face.

January 6. The little sores are almost well. The eye is slightly injected and a few drops of a two-grain to the ounce silver nitrate solution are instilled.

January 20. Twenty-four days since the first observation, the case is practically well; as a precaution it is kept under observation until March 9, when it is discharged cured.

CASE II.—M. C., white female, aged one and a half years, was brought to the clinic February 17, 1896. The eyes have been sore for a day or two and present the appearance of catarrhal conjunctivitis of moderate severity. The lids being everted are found to be lined with a thin pellicle, easily removed, which extends to the bulbar conjunctiva at a few points. There are some minute blister-like spots on the skin of the eyelids and a little sore on the tip of the nose. The temperature is normal, and the child does not look ill.

Case I. having made me suspicious, $2^1/_2$ cc. of antitoxin (all at hand) are at once injected subcutaneously, and a culture-tube prepared.

February 19. Five cc. of antitoxin subcutaneously. Temperature normal. Dr. Archinard reports true diphtheria; Klebs-Löffler bacilli in the culture.

February 21. No membrane forming; temperature normal.

February 24. Practically well; still some catarrhal inflammation. Seven days since first observation.

March 9. Discharged cured. In this case there was no local treatment other than keeping the eye clean with borax water.

CASE III.—M. M., white female, aged 2 years, was brought to the clinic February 22, 1896. Nine days ago the left eye became inflamed, the inflammation extending to the other eye next day. The picture is one of catarrhal conjunctivitis with moderate muco purulent secretion. There is some thin, adherent, whitish membrane ("croupous") on the palpebral conjunctiva of each eye. The temperature is normal and the child does not seem ill. Locally, for cleanliness, borax and camphor water drops are ordered to be instilled every half hour and 5 cc. of antitoxin are at once subcutaneously injected.

February 23. Dr. Archinard reports the case to be one of true diphtheria.

February 25. Much improved; little membrane on left eye only.

February 28. Practically well; discharged cured; borax drops to be continued a little while.

It will be seen that in these cases not only were the eye symptoms not to be distinguished by observation alone from those of moderate catarrhal conjunctivitis accompanied by the formation of a trifling and apparently pseudo-croupous membrane, a thing common enough, but the general symptoms of the disease were most conspicuous by their absence. These cases would never have been recognized as diphtheria but for one accidental finding, and I have no doubt that more frequent search would discover a much larger number. Should diphtheria again prevail in our community, I intend, with the assistance of my colleague, Dr. Archinard, who kindly conducted the bacterial research for me, to prosecute such a search and hope to be able to elicit more extensive and exact information; for it is evident that since the discovery of the Klebs–Löffler bacillus and of antitoxin this whole chapter of our knowledge must be re-written. The very important bearing of such cases

on the general welfare of a community is obvious. In the first place they emphasize the perfect reliability of the diphtheria antitoxin as a specific remedy. The most skeptical could not doubt the evidence of this local manifestation of a general disease disappearing under the influence of the subcutaneously injected remedy without local treatment. In the second place, such mild cases of so deadly a disease must be particularly dangerous as sources of infection, and they have doubtless caused many a case the etiology of which has remained shrouded in mystery. It is evident that during the prevalence of diphtheria children with "sore eyes" should be regarded with wholesome suspicion and should be segregated from their companions until the innocence of their affection is proven, particularly as this is now so quickly and readily accomplished by our skilled bacteriologists.

Xerosis of the Conjunctiva.

Case I.—(36888). A small, very black girl, aged 4 years, is brought to the clinic because "she can't see at night" March 18, 1897. Her general health is said to be fair; she looks scrofulous, has a pustular eruption on temples and neck, and several swollen cervical glands. The mother has much the same general appearance including the glandular enlargement. That portion of the child's bulbar conjunctiva which is exposed in the natural palpebral opening looks as though it were covered with extremely thin and semi-transparent but stiff black silk the surface being marked with innumerable minute greasy dots. All the conjunctiva normally covered by the eyelids is perfectly natural in appearance. The affected part of the membrane is thrown into a great number of very fine vertical folds or wrinkles by every lateral motion of the eyeballs. A small quantity of white foam lies upon the edges of the eyelids.

This disease has been well described by Dr. Kollock, of Charleston, S. C., in the "Transactions of the American Ophthalmological Society," for 1890, who has found it quite common among the negroes of that locality. The present case is noteworthy as the first I have ever seen in this city during a practice of fifteen years including many thousand negro patients. The mother had not observed anything wrong with the child's eyes; she was worried over the hemeralopia only, the

curiously corellated symptom of this condition. Unfortunately the child was too young and dull to permit of measuring the visual acuity. A mercurial salve was applied to the eruption on the neck and temple, and one-forty-eighth of a grain of bichloride well diluted ordered to be given once a day. The patient returned once or twice and then, much to my regret, disappeared.

[NOTE.—Since writing the above a second patient with the same disease has presented himself and is now under treatment at the clinic. He is a mulatto boy, about 12 years old, apparently well-nourished. He bleeds frequently from the gums and sometimes from the nose. Hemeralopia is marked although ordinary vision is good.]

ACUTE VISION UNDER EXCEPTIONAL CIRCUMSTANCES.

CASE I.—(25612). A white school boy, aged 9 years, came to the clinic January 28, 1895. Five years ago, he says, he stuck a knife in his left eye. His general health is good. Left eye is destroyed; it is injected and tender and V.=0; right eye normal, except that the pupil is contracted, being not more than one-eighth of an inch in diameter. The upper two-thirds of this small pupil are blocked with exudate leaving a clear space below hardly more than a pin's head in size and yet through this he sees $^{20}/_{XV}$ well. This is very remarkable when we consider that the condition is due to a pre-existing iritis, and that, too, an iritis, we must suppose, of sympathetic origin. None of us who saw the eye expected anything but very poor vision of it and yet the above measurement was obtained by several observers. We advised the enucleation of left eye, but it was declined and the patient never returned.

CASE II.—A white woman, aged 25 years, and of good general appearance, presented herself on February 24, 1896, with both eyes red and watery, in which condition she said they had been off and on for two years. The pupils being dilated with atropine and the media proving perfectly clear, choroiditis disseminata was observed; the macula seeming to be involved in extensive atrophic changes at the very center of right eye. The patient stated that she had been treated for the choroidal disease at another clinic six years ago. Vision proved to be $^{20}/_{L}$ R. E., and $^{20}/_{XX}$ L. E.. but with + 1 c. ax. 75°

R. E.=$^{20}/_{XV}$ and L. E. with + 1 c. ax. 75°=$^{20}/_{XV}$, the same holding good under full atropine paralysis. These glasses were ordered. With these she could read Sn. No. 1 readily at the ordinary distance. The vision of the right eye astonished every one who saw the extensive changes in the choroid situated, as I and all my assistants agreed, in the immediate neighborhood of the yellow spot. I have always been inclined to think the perfection of vision for far and near a more reliable and important index of absence of disease of the fundus than inspection with the ophthalmoscope, so numerous are the variations in appearance of the normal fundus that may readily be taken for slight or incipient disease, and such I still believe to be a safe general rule and one capable of saving us from many ridiculous mistakes. This case, however, has put me on my guard and serves to prove that the results (at any rate) of very extensive pathological changes near the very center of the retina are not incompatible with absolute perfection of visual acuity.

BOOKS AND PAMPHLETS.

A COMPARATIVE STUDY OF THE AREA OF ACUTE VISION IN VERTEBRATES. By JAMES ROLLIN SLONAKER. Reprinted from the *Journal of Morphology*, Vol. XIII., No. 3. Boston: Quinn & Co. 1897.

The author has in this pamphlet given us in detail the results of excellent and exhaustive studies concerning the area of acute vision in animals. The text is illustrated by a large number of drawings and especially fine photographic reproductions. We want particularly to draw the attention of our readers to this excellent thesis.

VADE MECUM OF OPHTHALMOLOGICAL THERAPEUTICS. By DRS. LANDOLT and GYGAX. (Translation by DR. E. H. NEYMAN). Philadelphia: J. B. Lippincott Co. 1898. Price, $1.00.

A safc guide to the "busy" general practitioner and student. The subjects are arranged in alphabetical order, which makes this little book very handy. It contains nothing concerning modern and unestablished forms of treatment.

THE KEYSTONE RECORD BOOK OF OPTOMETRIC EXAMINATIONS. Philadelphia: The Keystone. 1897.

A very handy book for recording the results of examinations of the optical and muscular conditions of eye. It is well arranged and gotten up nicely and substantially.

ABOUT CHILDREN. SIX LECTURES TO THE NURSES IN THE TRAINING SCHOOL OF THE CLEVELAND GENERAL HOSPITAL. By S. D. KELEY, M.D. Cleveland: *Medical Gazette* Publishing Co. 1897. Price, $1.25.

This book is full of good practical advice to the class of people it is intended for and many besides. That the subject of the eyes of the newly-born and the danger from infection during and after birth has not received a more thorough treatment, is to be deplored. Nurses, it seems to us, should be particularly well posted in this direction.

SYSTEM OF DISEASES OF THE EYE. Edited by W. F. NORRIS, M.D., and CHAS. A. OLIVER, M.D. Volume II. Philadelpoia: J. B. Lippincott Co. 1897.

This second volume contains chapters on "Examination of the Eyes," "School Hygiene," "Statistics of Blindness," and "Antisepsis." Among these are chapters by H. Snellen, E. Jackson, A. Javal, Geo. E. Stevens and S. D. Risley, which we more particularly recommend to our readers. Yet, it is perhaps not fair to select any special articles. They are all excellent and bear the mark of true scholarship. No oculist can well afford to do without this work.

PAMPHLETS.

"Ichthyol in Trachoma," by M. Ebersou, M.D.

"Address in Ophthalmology," by J. E. Willets, M.D.

"Report of the Nederlandsch Gasthuis at Utrecht," 1897.

"Ichthyol in the Treatment of Trachoma, Etc.," by Dr. Javorides.

"Some Statistics on Blindness and Deafness," by G. G. Lewis, M.D.

"Scopolamine Hydrobromate as a Cycloplegic," by T. E. Murrell, M.D.

"A Case of Lead Poisoning Presenting Some Unusual Eye Symptoms," by C. A. Wood, M.D.

"An Ophthalmoscopic Study of a Case of Hæmorrhagic Neuroretinitis," by Ch. A. Oliver, M.D.

"An Arithmetic and Geography on Blindness in New York State," by Lucien Howe, M.D.

"A Case of Bilateral Melanotic Tumors, Probably Cysts of the Ciliary Body," by M. W. Zimmermann, M.D.

"An Adjustable Lamp or Light-Screen, Especially Adapted to the Shadow-Test," by M. W. Zimmermann, M.D.

"The Normal Directions of the Planes of Vision in Relation to Certain Cranial Characteristics," by Geo. T. Stevens.

"The Directions of the Apparent Vertical and Horizontal Meridians of the Retina, Etc., With a Description of the Clinoscope," by Geo. T. Stevens, M.D.

Vol. XIV. No. 12. DECEMBER, 1897. Whole No. 168.

THE AMERICAN JOURNAL OF OPHTHALMOLOGY

EDITED AND PUBLISHED BY

ADOLF ALT, M.D.

ASSISTANT EDITOR,

J. ELLIS JENNINGS, M.D.

CONTENTS.

ORIGINAL ARTICLES.

PAGE

The Effect of Intense Flashes of Electricity Upon the Eye. By DUNBAR ROY, A B., M.D. 353

Can We Prevent Color-Blindness by Education of the Color-Sense in Infancy? By L. R. CULBERTSON, M.D. 3

Operation Intended as Substitute for Extirpation of Lachrymal Gland or Duct. (Illustrated). By JOHN JOHNSON KYLE, M.D. 369

Cases From the Clinic. By HENRY DICKSON BRUNS, M.D. 372

BOOKS AND PAMPHLETS.

A Comparative Study of the Area of Acute Vision in Vertebrates 385

Vade Mecum of Ophthalmological Therapeutics 385

The Keystone Record Book of Optometric Examinations 385

About Children 385

System of Diseases of the Eye 386

Pamphlets 386

SUBSCRIPTION, - $3.50 A YEAR IN ADVANCE.

PUBLISHED MONTHLY.

3036 LOCUST STREET, . ST. LOUIS, MO.

ENTERED AT THE POST OFFICE AT ST. LOUIS MO. AS SECOND-CLASS MATTER

COLLABORATORS.

—o—

ALLPORT, Dr. F., Minneapolis, Minn.
AYRES, Dr. S. C., Cincinnati, Ohio.
BEARD, Dr. C. H., Chicago, Ill.
BURNETT, Dr. Swan M., Washington, D. C.
BRUNS, Dr. H. Dickson, New Orleans, La.
FRYER, Dr. B. E., Kansas City, Mo.
GREEN, Dr. John, St. Louis, Mo.
HANSELL, Dr. H. F., Philadelphia, Pa.
HOTZ, Dr. F. C. Chicago, Ill.
HOWE, Dr. L., Buffalo, N. Y.
KIPP, Dr. D., Newark, N. J.
MILLIKIN, Dr. B. L., Cleveland, Ohio.
POOLEY, Dr. T., New York.
PROUT, Dr. J. S., Brooklyn, N. Y.
RISLEY, S. D., Philadelphia, Pa.
STRAWBRIDGE, Dr. G., Philadelphia, Pa.
THEOBALD, Dr. S., Baltimore, Md.
THOMSON, Dr. W., Philadelphia, Pa.
THORINGTON, Dr. J., Philadelphia, Pa.
WADSWORTH, Dr. O. F., Boston, Mass.
WEBSTER, Dr. D., New York, N. Y.

DEAR DOCTOR: The perfect results obtained by the use of the **"New York Pasteur Institute Antitoxic Serums"** *has induced me to make arrangements WITH THE INSTITUTE, to supply the local medical profession promptly with the following products:*

PASTEUR INSTITUTE DIPHTHERIA—Gibier's Double Anti-toxin	$ 5 00.
DIPHTHERIA ANTITOXIC SERUM, in 25 ccm. Vials	3.00.
" " " in 7 ccm. Vials	1.25.
" " " Dry 1 gm. in 16 ccm. Vials	1.80.
More than 300 cases have been treated with this Serum, to our knowledge, by St. Louis Physicians, all without failure).	
TETANUS ANTITOXINE, Dry, in 25 ccm. Vials	5.00.
TUBERCULOUS " Formula of Prof. Ricket, from the mule, Dry, in 25 ccm. Vials	1.50.
STREPTOCOCCUS " " of Dr. Marmorek " " "	2 50.
SYPHILIS " " " " "	1.50.
ERYSIPELAS AND PRODIGIOSUS TOXINES, for Malignant Tumors	3.00.
VACCINE VIRUS, for 2, 5 or 10 Vaccinations	25 c.—0.75.
KRIEGER'S SPERMINE, for treatment of Nervous Centers; Dozen Vials	3 00.

We also carry the GERMAN DIPHTHERIA ANTITOXIN, Behring's Nos. 0, 1, 2 and 3, at 60cts., $1.50, $3.50 and $3.50 per vial.—Aronson's at 35 cts. HYPODERMIC SYRINGES, Aseptic, Koch's, Pasteur's, as well as other makes and Needles. PLAIN GAUZES—good weight—25 yard rolls, $1. MEDICATED GAUZES, Cotton, etc., at factory prices. FEVER THERMOMETERS, Taylor's, with Certificate, 35 cts.—95 cts; J. & J. Corres. and Carbol. SOAPS, at 5 cts. a cake, &c. LITERATURE regarding Antitoxines cheerfully furnished. Goods by Telephone Orders delivered in due time.

G. L. BLUM & CO., 3000 Olive St. *T. A. KLIPSTEIN, 1600 Franklin Ave.*
ST. LOUIS, MO. *ST. LOUIS MO.*

Perfect eyesight is ruined by imperfect lenses. The best of lenses will not focus or improve bad engravings. For post-graduate and perfect work go to the

WESTERN ENGRAVING CO.,

214 and 216 Chestnut Street, . ST. LOUIS, MO.

LISTERINE IN Ophthalmology AND Otology

The same satisfactory results following the use of LISTERINE in all sub-acute and chronic inflammations of mucous membrane (whether urethral, vaginal, nasal or pharyngeal), is attained by its *judicious* employment upon the more sensitive surfaces of the eye and ear.

The presence of pus, and succulent appearance of an abraded surface, with tendency to capillary hæmorrhage, are certain indications for LISTERINE, which has been pronounced, by an authority, in the treatment of these affections, "A balsamic astringent without a rival."

LISTERINE IN Rhinology AND Laryngology

In the treatment of Chronic Nasal Catarrh, and the varied affections of the Nose, Throat and Lungs, the advantages of LISTERINE are such that it has superseded many of the oldest and most popular remedies. With its certain antiseptic and prompt deodorant properties, it combines a mild stimulating influence (easily graded by dilution) free from irritating effect. Applied by means of spray to those surfaces which are accessible, it quickly loosens tenacious mucous secretions, and the boracic acid, being in perfect solution, is readily conveyed to, and deposited upon, the innermost recesses of the air passages.

DESCRIPTIVE LITERATURE UPON REQUEST.

LAMBERT PHARMACAL COMPANY, St. Louis, Mo.

LISTERINE is kept in Stock by the leading dealers in Drugs and Medicines throughout the World.

A. P. ERKER & BRO.,

PRACTICAL OPTICIANS,

608 Olive Street, : ST. LOUIS, MO.

TRIAL CASES and TRIAL FRAMES of all Descriptions.

Ophthalmometers, Ophthalmoscopes, Etc.

We have the Best Equipped Plant for grinding special lenses. Send us your prescriptions. We guarantee accurate work, prompt returns and low prices.

A. S. ALOE CO.,

Manufacturers and Dealers in

OPTICAL AND SURGICAL INSTRUMENTS.

We carry a complete stock of Optical and Surgical Instruments, including all the latest improvements for EYE, EAR, NOSE and THROAT Work.

It is our determination to fully meet the wants of the profession in every department of our business.

UNEQUALED FACILITIES FOR THE PROMPT AND ACCURATE FILLING OF

OCULISTS' PRESCRIPTIONS.

SATISFACTION GUARANTEED. PRICES ON APPLICATION

Book of ℞ Blanks Free.

Specialties for Specialists, Including a Full Line of

Models of the Eye in Papier-Mache and Plaster,
Specimens and Models of Human Osteology,
Normal and Pathological Models in Wax,
Obstetrical Models and Manikins,
Physiological Apparatus,
Charts of Eye and Ear,
Models of the Sense Organs,
Dudgeon Richardson Sphymograph,
Electro-Therapeutical Apparatus.
And the Largest Assortment of
ARTIFICIAL EYES in America.

Special arrangements made for importations for schools and colleges.

For further information address,

A. S. ALOE CO.

517 Olive Street, St. Louis Mo.